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ORIGINAL RESEARCH

Development and Validation of the Organizational Stressor Indicator for Sport Performers (OSI-SP)

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The series of related studies reported here describe the development and validation of the Organizational Stressor Indicator for Sport Performers (OSI-SP). In Study 1, an expert and usability panel examined the content validity and applicability of an initial item pool. The resultant 96 items were analyzed with exploratory factor analyses in Study 2, with the factorial structure comprising 5 factors (viz., Goals and Development, Logistics and Operations, Team and Culture, Coaching, Selection) and 33 items. Using confirmatory factor analyses, Studies 3 and 4 found support for the 5-factor structure. Study 4 also provided evidence for the OSI-SP's concurrent validity and invariance across different groups. The OSI-SP is proposed as a valid and reliable measure of the organizational stressors encountered by sport performers.

Keywords: athlete, demands, measurement, occupational, psychometric, stress

Organizational stress has emerged as an important issue in sport performers' preparation for and performance in competition (Fletcher, Hanton, & Mellalieu, 2006; Fletcher & Wagstaff, 2009). In their review of the area, Fletcher et al. (2006) defined organizational stress as "an ongoing transaction between an individual and the environmental demands associated primarily and directly with the organization within which he or she is operating" (p. 329) and highlighted organizational-related demands as a salient component of the stress process in sport. In a recent research synthesis of the organizational stressors that sport performers encounter, Arnold and Fletcher (2012b) reviewed the findings of 34 studies and identified 640 distinct demands. They proffered a taxonomic classification of these stressors with 31 subcategories and four main categories: leadership and personnel, cultural and team, logistical and environmental, and performance and personal issues.

Although much is known about the organizational stressors that sport performers encounter, scholars have yet to develop a method of assessing these phenomena. Researchers have attempted to measure the daily hassles that athletes experience (Albinson & Pearce, 1998; Rushall, 1987), but this work did not specifically focus on organizational stressors and has not been exposed to rigorous psychometric testing. These issues are problematic because, as Fletcher and Hanton (2003) concluded, "it will be very difficult to make significant advances in psychologists' understanding [of organizational stress in competitive sport] without a valid and reliable measurement tool" (p. 192; see also Hanton, Fletcher, & Coughlan, 2005). Following Fletcher et al.'s (2006) observation that "researchers are now at a critical stage in building a body of knowledge; namely, that there exists an urgent need to develop a comprehensive measure of organizational stress in sport performers" (p. 354), Kristiansen, Halvari, and Roberts (2012) recently developed measures to assess perceived coach–athlete and media-related stressors. These scales, however, only measure 2 of the possible 31 subcategories of organizational stressors identified by Arnold and Fletcher (2012b); therefore, to better understand sport performers' organizational stress experiences, a measure still needs to be developed that assesses a broader range of organizational issues (Kristiansen et al., 2012).

In seeking to advance this line of inquiry, Arnold and Fletcher (2012a) recently reviewed psychometric issues in organizational stressor research (see also Campbell-Quick, 1998; Rick, Briner, Daniels, Perryman, & Guppy, 2001) and discussed the implications for sport psychology. They identified four main areas of psychometric issues (viz., conceptual and theoretical, item development, measurement and scoring, analytical and statistical) and concluded by proposing 15 main recommendations (see Table 1) that sport psychology researchers should reflect on when developing a measure of organizational stressors.

Although journal space restrictions preclude a detailed discussion of all the areas and recommendations shown in Table 1, it is worth briefly elaborating on the

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Table 1 Main Psychometric Issues and Recommendations for Developing a Measure of Organizational Stressors (adapted from Arnold & Fletcher, 2012a)

Main Area	Recommendation
Conceptual and Theoretical Issues	A commonly accepted definition of stress is required before meaningful measurement can commence. In view of the continual interplay that exists between the individual and their surrounding environment, it is suggested that researchers adopt a transactional conceptualization of stress.
	Measurement that springs from theory can provide scholars with a greater understanding of stress concepts and their findings. As a result, researchers should establish or locate a theory explaining the nature of stress that can be used to inform measurement.
	Ideally when measuring stress, researchers should attempt to assess the whole stress phenomenon; however, this can pose significant difficulties for stress measurement. In view of this, researchers should be clear about what they are measuring and perhaps generate a series of measures that assess the main components of the stress process and the relationships among them.
Item Development Issues	Measures should recognize the temporal course of the stress phenomenon, distinguish between acute and chronic stressors, and emphasize both types of demand.
	When developing items, researchers should remain inclusive and attempt to develop a large item pool that captures all facets of the concept under consideration.
	Careful attention should be paid to the wording and phraseology of items, ensuring that they have contemporary relevance.
	Measures of organizational stressors should incorporate both general and specific items to enhance ecological validity and enable comparisons across sports.
Measurement and Scoring Issues	Researchers should be aware of the objective versus subjective measurement debate, recognize the limitations of their chosen method and, in an effort to negate these, consider adopting a triangulation strategy.
	The extent of each demand should be measured by exploring the complexities of performer organization transactions and assessing multiple dimensions of stressors.
	Researchers should consider the most appropriate response format for their questionnaire and the optimal number, wording, and layout of response options.
	Additive scoring methods should be used to assess the independent effects of diverse groups of stressors and not lose sight of individuals as complex human beings.
Analytical and Statistical Issues	When validating a questionnaire, scholars should pay careful attention to sample selection and ascertain whether the spread of the data deviates from a normal distribution.
	The factor structure of a questionnaire and the loadings of items onto factors should be examined. Factor rotation is then typically used to ensure that variables are loaded maximally to only one factor, therefore, making interpretation easier.
	A large sample size should be selected for confirmatory factor analysis, to check that the preidentified model structure is reliable.
	The effects of background, occasion, and nonconstant confounding variables should be measured and controlled for where possible.

conceptual and theoretical issues since these will underpin the initial design of an assessment tool. Fletcher and colleagues (Fletcher & Fletcher, 2005; Fletcher et al., 2006; Fletcher & Scott, 2010) developed a metamodel that, in line with the transactional conceptualization of stress (cf. Cox, 1978; Lazarus & Launier, 1978), offers a theoretical explanation of the relationships among stress, emotions, and performance. The basic premise is that "stressors arise from the environment the performer operates in, are mediated by the processes of perception, appraisal and coping, and, as a consequence, result in positive or negative responses, feeling states, and outcomes" (Fletcher et al., 2006, p. 333). This ongoing process is moderated by various personal and situational characteristics. The metamodel can be divided into three main theoretical stages: person–environment (P-E) fit, emotion–performance (E-P) fit, and coping and overall outcome (COO). The first stage proposes that strain arises not from the person or environment separately, but rather by their misfit or incongruence with one another. The second stage focuses on the notion of E-P fit, which proposes that negative feeling states occur when the relationship between an emotion and performance is out of equilibrium. The third stage focuses on coping with these reactions and proposes that negative outcomes occur through the inadequate or inappropriate use of coping strategies. When applying this model to organizational stress, Arnold and Fletcher (2012b) pointed out that the most significant hindrance to testing its proposals has been the lack of a valid and reliable means of assessing the organizational stress encountered by sport performers (cf. Fletcher & Hanton, 2003; Fletcher et al., 2006; Hanton et al., 2005; Kristiansen et al., 2012).

It is apparent from the metamodel (cf. Fletcher et al., 2006) that, when measuring organizational stress, researchers should ultimately strive to provide a comprehensive assessment of the overall stress phenomenon, including stressors, appraisals, responses, feeling states, coping, and outcomes. However, as Lazarus (1990) recognized, attempting to take this holistic approach will "pose great difficulties for stress measurement . . . [and] the search for a single satisfactory measure is doomed to failure" (p. 4). As a result of this observation, Arnold and Fletcher (2012a) recommended that rather than attempting to develop a single measure of organizational stress, it is perhaps more pragmatic to develop a series of measures that assess the main components of the stress process and capture the relationships between them. Therefore, it seems logical for scholars to begin by developing a measure to assess the stimulus of the organizational stress process in sport—namely, the organizational stressors that sport performers encounter—before progressing to other components. An important consideration when assessing this component of the stress process is capturing the multidimensional nature of stressors, including the frequency (frequent versus infrequent), intensity (high versus low demand), and duration (acute versus chronic) of stress-related encounters (Arnold & Fletcher, 2012a; see also Dewe, 1991; Hurrell, Nelson, & Simmons, 1998).

In the current research we developed and validated a measure of the organizational stressors encountered by sport performers via a series of related studies. The purpose of Study 1 was to provide evidence for the content validity of an organizational stressor item pool and gauge how applicable the items were to sport performers. The aim of Study 2 was to analyze the factorial composition of the emergent items via an exploratory factor analysis (EFA). The purpose of Study 3 was to use a confirmatory factor analysis (CFA) to cross-validate the findings of the EFA with a different sample of performers. The aim of Study 4 was to use another sample to cross-validate the structure of the measure. This final study also examined the relationships between organizational stressors and other relevant concepts, and investigated whether the components of the measurement model were invariant across different groups.

Study 1

The first objective of Study 1 was to create a pool of items that comprehensively captured the organizational stressors encountered by sport performers and to provide evidence for its content validity. This type of validity is an important aspect of scale development and pertains to whether items are relevant to and representative of the targeted construct being measured (Haynes, Richard, & Kubany, 1995). Secondly, this study aimed to gauge how applicable the developed items were to sport performers.

Method

Participants. To evaluate the content validity of the items, 28 individuals were recruited to be in an expert panel. This panel comprised academics in sport and organizational psychology, practicing sport psychologists, PhD research students, and sport performers (see Table 2). To explore the second objective of this study, a separate usability panel of 10 sport performers was recruited (see Table 2).

Measure. A three-part measurement indicator was developed underpinned by Fletcher et al.'s (2006) definition of organizational stressors—"environmental demands (i.e., stimuli) associated primarily and directly with the organization within which an individual is operating" (p. 329)—and based on Arnold and Fletcher's (2012b) taxonomic classification of the organizational stressors encountered by sport performers. Part A of the indicator contained 31 items reflecting the subcategories in the taxonomic classification, and participants were asked to rate the frequency, intensity, and duration of these items. Part B contained 474 items that assessed the elements (stressors) within the subcategories. Although the taxonomic classification consists of 640 stressors, some of the items in Part B were worded in such a way that they covered more than one of the stressors from the taxonomy. This was done to keep the length of the indicator and the expert panel's task manageable. For example, the stressors "I have limited autonomy in my training regime" and "my coach designs training with little input from me" were both measured by the item "I have limited input into my training regime." Respondents were not required to complete all 474 items in Part B; rather, to keep their task manageable, they summated their frequency, intensity, and duration scores for each item in Part A and only answered their five highest scoring sections in Part B. Part C encouraged respondents to express any other organizational stressors that they had encountered that were not captured in the previous parts. In all parts of the indicator, the stem "In the past month, I have experienced pressure associated with . . ." was presented, to which the participants responded on three rating scales with options ranging from 0 to 5. These scales were as follows: frequency ("how often did this pressure place a demand on you?") (0 = *never*, 5 = *always*), intensity ("how demanding was this pressure?") (0 = *no demand*, 5 = *very high*), and duration ("how long did this pressure place a demand on you for?") (0 = *no time*, 5 = *a very long time*).

Table 2 Participant Characteristics (Studies 1, 2, 3, and 4)

	Study 1: Expert Panel	Study 1: Usability Panel	Study 2	Study 3	Study 4
N	28	10	606	350	321
Male	15	6	259	212	174
Female	13	4	347	138	146
Unknown Gender	0	0	0	0	1
M_{age} (*SD*)	30.99 (8.45)	27.49 (8.16)	22.32 (5.36)	28.10 (12.29)	29.92 (12.82)
Age Range	21–56	20–43	18–61	18–74	18–78
Number of Nationalities	6	3	19	14	20
Number of Sports	10	7	39	38	33
Sport Type					
Team (e.g., Football, Hockey, Netball, Rugby, Volleyball)	4	2	16	14	14
Individual (e.g., Boxing, Golf, Skiing, Triathlon, Weightlifting)	2	4	18	17	11
Team and Individual Based (e.g., Badminton, Diving, Rowing)	4	1	5	7	8
Competitive Level					
Club	5	3	163	138	131
County	3	1	35	14	16
Junior National	0	0	19	22	9
State/Regional	0	1	27	14	32
Collegiate/University	5	1	209	68	49
Senior National	0	1	62	52	35
International	2	3	90	42	48
Other	13	0	0	0	0
Unknown Level	0	0	1	0	1
M_{time} Competing (*SD*)	14.56 years (7.47)	19.86 years (9.08)	10.69 years (5.93)	11.37 years (9.26)	13.45 years (11.53)
Range of Time Competing	6–46 years	10–35 years	2 months–56 years	2 months–57 years	2 months–65 years
Academics—M_{time} Worked in Academia (*SD*)	5.36 years (7.01)	Not applicable	Not applicable	Not applicable	Not applicable
Academics—Range of Time Worked in Academia	1 month–30 years	Not applicable	Not applicable	Not applicable	Not applicable
Academics—Publications Published in an International Peer-Reviewed Journal	1–150	Not applicable	Not applicable	Not applicable	Not applicable
Academics—Number That Have Researched Organizational Stress	4	Not applicable	Not applicable	Not applicable	Not applicable
Sport Psychologists—Total Number of Sports Supported	30	Not applicable	Not applicable	Not applicable	Not applicable
Sport Psychologists—M_{time} Providing Psychological Support (*SD*)	3.19 years (4.68)	Not applicable	Not applicable	Not applicable	Not applicable

Procedure. Institutional ethical approval and participant informed consent were obtained for all of the studies reported in this article. To keep their task manageable, the 28 expert panel members were divided into six groups of approximately equal size. Each member was sent an expert panel pack (specific to their group), which consisted of approximately five random items from Part A and the related items in these five sections in Part B. This pack took approximately 45–60 min to complete. For each item in their pack, experts were asked to rate the relevance ("does this question potentially relate to the sport organization environment?" for Part A and "does this question reflect the pressures relating to [stressor category]" for Part B), clarity ("is this question easily understood" for both parts), and specificity ("is this question general enough to capture all the related pressures in this area" for Part A and "is this question specific enough" for Part B) by indicating yes, no, or maybe on the response options (cf. Dunn, Bouffard, & Rogers, 1999). In addition, experts were provided with the opportunity to write specific comments on each item and general comments on the indicator. Collecting both quantitative ratings and qualitative comments enabled the researchers to assess the items' content relevance so that they could be revised as necessary (Dunn et al., 1999; Haynes et al., 1995). The sport performer usability panel was provided with all three parts of the indicator. Following completion, the performers were invited to suggest any additions, deletions, or modifications and were asked about the indicator's readability, comprehension, difficulty, suitability to sport performers, format, presentation, flow, and rating scale usability.

Results

Nine of the 31 items in Part A (29.0%) received unanimous endorsement from the expert panel regarding their relevance, clarity, and specificity; therefore, these items remained the same. A further 12 items in Part A (38.7%) also remained unchanged, since they were viewed as relevant, clear, and specific by >75% of the raters. The remaining 10 items in Part A (32.3%) received endorsement by <75% of the raters; therefore, these items were subsequently modified or deleted. For Part B, all raters unanimously endorsed 170 items (35.9%) and 196 items (41.4%) were rated as relevant, clear, and specific by >75% of the expert panel. In Part B, 108 items (22.8%) received endorsement from <75% of the raters and were therefore modified or deleted. Although these results suggest that the majority (i.e., 366, or 77.2%) of items should remain unchanged in Part B, the qualitative comments from the expert panels and sport performers suggested that calculating scores for Part A and completing Parts B and C was too taxing and time consuming. As a result, although Parts B and C were deemed helpful for sport psychology practitioners in diagnosing organizational stressors, the indicator was shortened considerably. Specifically, Parts B and C were removed and items in Part A were modified and extended to include approximately five items reflecting each subcategory of the organizational stressor taxonomy (cf. Arnold & Fletcher, 2012b). The stem and rating scales remained the same.

The result of this process was a revised 160-item Part A, which was sent to a random sample from the original expert panel (n = 10) who were asked to rate the relevance, clarity, and specificity of each item. Based on this feedback, approximately three of the most relevant, clear, and specific items were selected for each of the 31 subcategories. These modifications produced a revised 96-item questionnaire, which was named the Organizational Stressor Indicator for Sport Performers (OSI-SP). The indicator was returned to the sport performer usability panel to complete and provide feedback. Following some minor changes to the wording of items and the indicator's presentation, the authors deemed that the 96-item OSI-SP was clear and applicable to the sport context and, therefore, ready for psychometric evaluation with a larger sample.

Study 2

The purpose of Study 2 was to analyze the factorial composition of the 96-item OSI-SP with an EFA.

Method

Participants. For participant (n = 606) details, see Table 2.

Measure. The 96-item OSI-SP produced in Study 1 was distributed to participants.

Procedure. Data collection took place using both online (n = 293) and paper (n = 313) versions of the OSI-SP.[1] The instructions at the start of the OSI-SP informed participants that the indicator examined pressures experienced as part of participation in competitive sport over the past month.

Data Analysis. An overarching philosophical assumption of factor analysis is that a group of observed variables (items) are reflective of an underlying latent variable (Mulaik, 2010). This reflective nature of factor analysis is in contrast to a formative measurement model, where items cause the underlying latent variable (cf. Coltman, Devinney, Midgley, & Veniak, 2008; Kline, 2006).

In accordance with this reflective/formative distinction, factor analysis was deemed the most appropriate technique for analyzing the data in this (and the following two studies), since the organizational stressors measured on the OSI-SP are reflecting, and are likely being caused by, underlying organizational processes (cf. Fletcher et al., 2006). Indeed, many of the most influential theories (and attendant measurement instruments) of organizational stressors and job design are based on the premise that organizational, social, and sociotechnical processes manifest themselves as more specific stressors or job characteristics (see, e.g., Hackman & Oldham, 1975, 1976; Karasek & Theorell, 1990; Katz & Kahn, 1966). Furthermore, in organizational psychology and management science, research (and current measures) suggests that underlying and social processes in an organization are most appropriately assessed by reflective, factor analytic methods (cf. Pugh, Hickson, Hinings, & Turner, 1968; Rick et al., 2001; see also Daniels. 2000; Evers, Frese, & Cooper, 2000; Hicks, Bahr, & Fujiwara, 2010; Lyne, Barrett, Williams, & Coaley, 2000; Peacock & Wong, 1990; Williams & Cooper, 1998). The extent to which reflective measurement is adopted by organizational psychologists is embedded within the UK Health and Safety Executive's (HSE) Management Standards for Work Related Stress, whereby the HSE provide an indicator tool for organizations to use that assesses six organizational stressors based on a reflective model (Cousins, MacKay, Clarke, Kelly, Kelly, & McCaig, 2004).

Results

Preliminary Analyses. Only 0.47% of the possible data points were missing and no variable in the OSI-SP had >5% missing data; therefore, any data not present were assumed to be missing at random (cf. Tabachnick & Fidell, 2001). The expectation maximization algorithm was used to impute missing values. Following this imputation, the correlation matrix was examined to determine the suitability of the data for EFA. Given that Bartlett's test of sphericity suggested item interdependence (frequency $\chi^2 = 39715.58$, intensity $\chi^2 = 37152.22$, duration $\chi^2 = 37800.26$, $p < .01$), and that an acceptable Kaiser–Meyer–Olkin sampling adequacy statistic was observed (frequency = .95, intensity = .95, duration = .96), the OSI-SP correlation matrix was deemed suitable for EFA.

Main Analyses. Since there were 96 items for each of the three rating scales (frequency, intensity, and duration), item parceling was used to reduce the number of variables and keep the model's degrees of freedom reasonable (Little, Cunningham, Shahar, & Widaman, 2002). Without item parceling, the number of parameters to be estimated would have exceeded the number of variances and covariances, therefore representing an underidentified model in which there would be insufficient information for a unique estimation of parameters (cf. Byrne, 2006). Three items were allocated to each parcel and these were grouped according to the content of the items (cf. Bandalos & Finney, 2001). Following this parceling, principal axis factor analysis was conducted with a direct oblimin rotation. An oblique rotation method was used since it was unlikely that the underlying factors of organizational stressors would be unrelated. Factor extraction was based on an eigenvalue of >1.0 (Kaiser, 1960) and inspection of the scree plot. This combination was deemed appropriate, since solely adopting Kaiser's criterion may lead to the retention of factors with no practical significance (Stevens, 2002). To interpret the extracted factors, Stevens (2002) suggested that the coefficient criterion adopted should reflect the size of the sample; therefore, this value was .21 based on the sample of 606 sport performers. In addition, all items with high cross-loadings (i.e., primary loadings of >.50 and secondary loadings of >.32) were omitted.

By applying the aforementioned criteria to the pattern matrix, we found a five-factor solution for the parcels. At this stage, it is important to note that this solution was not identical for the frequency, intensity, and duration response scale datasets, therefore allowing us to identify those parcels that were consistent across datasets (e.g., those that fitted into clear factors and were loaded to criteria across frequency, intensity, and duration response scales) and those that behaved in an inconsistent manner. For any inconsistent parcels, the constituent items were analyzed individually to ascertain whether they would form a coherent factor on their own. By removing nonpure parcels and creating new factors, we were able to identify a factor structure that was consistent across all three datasets. To see if all the items were required, following the confirmation of the factor structure at a parcel level, each item's contribution to the reliability of the parcels was observed, alongside its coefficient criterion and cross-loadings in a sequence of EFAs. To decide on items for removal, any item that did not meet the aforementioned criteria or contribute reliably to a factor was omitted in unison across all three response scale datasets. Applying these criteria resulted in 63 items being removed. The decision to omit items across all of the datasets was made because the frequency, intensity, and duration of organizational stressors are all reflective of underlying organizational processes, thus necessitating the same factor structure.

Following the removal of the items, a further EFA was conducted to confirm that the selected 33 items were producing a factor structure that was in accordance with the original parceling solution and consistent across all response scale datasets. This was the case and the final solution contained 33 items that loaded onto five factors and accounted for 53.64% of variance in the frequency solution, 52.10% in the intensity solution, and 52.98% in the duration solution. Factor 1, labeled Goals and Development, consisted of eight items that encapsulated the organizational stressors associated with an individual's feedback, progression, and transitions within his or her sport. Factor 2, labeled Logistics and Operations, consisted of 13 items that encapsulated the organizational stressors associated with the arrangement and implementation of procedures for training and/or competition. Factor 3, labeled Team and Culture, consisted of six items that encapsulated the organizational stressors associated with the attitudes and behavior within the team. Factor 4, labeled Coaching, consisted of three items that encapsulated the organizational stressors associated with the coach's personality and interpersonal skills. Factor 5, labeled Selection, consisted of three items that encapsulated the organizational stressors associated with how sport performers were chosen for teams and/or competitions. These five factors are reflective of the underlying organizational processes in a sport organization (cf. Fletcher et al., 2006). For example, goals and development stressors are reflective of the opportunities and barriers within the organization for a sport performer to progress; logistics and operations stressors are reflective of the efficiency of processes and procedures within the organization; team and culture stressors are reflective of the atmosphere and context of the sport and the organization within which the performer is operating; coaching stressors are reflective of the coaching structure and human resources processes in the organization; and selection stressors are reflective of the approach taken within organizations to selecting athletes or teams for competitions. Correlations between the factors ranged from .12 to .49 and all of the factors produced internally consistent scales (α >.81).

To further assess the internal reliability of the OSI-SP, item analysis was conducted following EFA (DeVellis, 2003). To test each item, the following criteria were adopted: (a) a minimum corrected item-total correlation coefficient of $r = .40$ and (b) an interitem correlation between $r = .20$ and $r = .70$ (Kidder & Judd, 1986). Thirty-two of the items fulfilled the first criteria, and the one that did not had an item-total correlation coefficient of .39. For the second criteria, eight interitem correlations (out of a potential 426) did not fall within the .20 to .70 range; however, they did fall between .17 and .79. In view of the small amount of violations and the exploratory nature of this study, all items were retained for further analysis.

Rating Scale Correlations. After the reliability of the factors and items had been established, the correlations between the frequency, intensity, and duration rating scales for each factor were examined. For each of the five factors (15 factor scores), r ranged from .85 to .91 (95% CI [.83, .93]). Since the correlations were all <1.00 (and the 95% CI does not cover 1.00), it was clear at this stage that the frequency, intensity, and duration rating scales are highly related but distinctive; therefore, all three were retained for further testing in Studies 3 and 4.

Study 3

The purpose of Study 3 was to cross-validate the findings of Study 2 using a CFA and, if necessary, further refine the structure of the OSI-SP.

Method

Participants. For participant ($n = 350$) details, see Table 2.

Measure. The 33-item OSI-SP, as described in Study 2, was distributed to participants.

Procedure. The procedures were the same as those outlined in Study 2. Both online ($n = 127$) and paper ($n = 223$) versions of the OSI-SP were distributed and collected.[1]

Data Analysis. The 33-item OSI-SP was analyzed with CFA using EQS 6.1 (Bentler & Wu, 2002). One item from each of the five factors was fixed to 1.0 for the purposes of identification and latent variable scaling. There is some debate in the literature over the practice of evaluating model fit and, specifically, which statistic researchers should use for such assessments (cf. Vernon & Eysenck, 2007). For example, some scholars have questioned whether fit indices should be used to supplement the chi-square statistic (cf. McIntosh, 2012), whereas others have emphasized the importance of adopting a variety of fit indices to judge the adequacy of a model (cf. Williams, Vandenberg, & Edwards, 2009). In view of the controversy surrounding the usage of statistics and indices and the lack of consensus on this matter, researchers have suggested reporting the chi-square statistic and a variety of fit indices (Byrne, 2006; Fayers & Aaronson, 2012; Hu & Bentler, 1999; Mulaik, 2007). Therefore, in line with this recommendation, multiple fit indices were used to evaluate the adequacy of the model to the data. These included the chi-square statistic, the comparative fit index (CFI; Bentler, 1990), the Bentler-Bonett non-normed fit index (NNFI; Bentler & Bonett, 1980), the standardized root mean residual (SRMR; Hu & Bentler, 1998), and the root mean square error of approximation (RMSEA; Steiger, 1990).

Despite the disagreement over which statistics and indices are most optimal, it is generally accepted for fit indices that an adequate fit between the data and hypothesized model is indicated by SRMR values of around .08 and RMSEA values of around .06 (Hu & Bentler, 1999). For the CFI, a value of >.90 was originally considered acceptable (Bentler, 1992); however, Hu and Bentler (1999) proposed a revised cutoff value of close to .95. Values for the NNFI can fall outside of the zero-to-1.00 range (Byrne, 2006); however, since the NNFI is a variant of the normed fit index (NFI), values for the NNFI should meet the above CFI guidelines to be considered acceptable. In this study, these values were used as guides rather than absolute values (cf. Marsh, Hau, & Wen, 2004), since the chi-square statistic and fit indices are not immune to misspecification; therefore, given values for each should not be interpreted as golden rules (Heene, Hilbert, Draxler, Ziegler, & Bühner, 2011), but rather the overall fit of a model should be assessed by considering several statistics in combination (Williams et al., 2009). Therefore, in addition to the fit indices, modification indices, standardized residuals, and standardized factor loadings were analyzed for model misspecification. Any items that displayed a large standardized residual (>|2.00|) or standardized factor loadings below .40 were considered for removal.

Results

Preliminary Analyses. Only 0.09% of the possible data points were missing and no variable in the OSI-SP had >5% of missing data; therefore, any data not present were assumed to be missing at random. The expectation maximization algorithm was used to impute missing values. The univariate skewness values of the 33 items ranged from –.40 to 2.03 and the univariate kurtosis values ranged from –1.26 to 4.60. For multivariate kurtosis, Mardia's normalized coefficients indicated that the data departed from multivariate normality (e.g., frequency = 32.59, intensity = 32.59, duration = 38.93). Therefore, in an attempt to correct for non-normality, all CFAs were conducted using the robust maximum likelihood (ML) estimation procedure with a Satorra–Bentler correction (S-Bχ^2; cf. Bentler & Wu, 2002; West, Finch, & Curran, 1995), and fit indices corrected for robust estimation.

Main Analyses. Results of the initial CFA with correlated factors suggested that modifications were required: Frequency S-Bχ^2 (485) = 992.11, $p < .001$, CFI = .87, NNFI = .86, SRMR = .07, RMSEA = .06, Intensity S-Bχ^2 (485) = 1111.06, $p < .001$, CFI = .86, NNFI = .84, SRMR = .07, RMSEA = .06, and Duration S-Bχ^2 (485) = 1059.72, $p < .001$, CFI = .86, NNFI = .84, SRMR = .07, RMSEA = .05. Therefore, in a sequence of CFAs, 10 problematic items were subsequently removed. Excluding these 10 items improved the fit of the model to the data: Frequency S-Bχ^2 (220) = 345.08, $p < .001$, CFI = .95, NNFI = .94, SRMR = .05, RMSEA = .04, Intensity S-Bχ^2 (220) = 383.05, $p < .001$, CFI = .94, NNFI = .93, SRMR = .05, RMSEA = .05, and Duration S-Bχ^2 (220) = 386.00, $p < .001$, CFI = .93, NNFI = .92, SRMR = .05, RMSEA = .05. These values indicate that the model is acceptable for the frequency, intensity, and duration scales if adopting the SRMR, RMSEA and original CFI guidelines (cf. Bentler, 1992). In accordance with Hu and Bentler's (1999) revised CFI cutoff value of .95, the model displays an acceptable fit to the frequency scale and is close to acceptable values for the intensity and duration scales.

Correlations between the five frequency, five intensity, and five duration latent variables ranged from .47 to .74 (95% CI [.28, .83]). Since none of these values or their 95% CI range encompass 1.00, this finding provides evidence for the discriminant validity of the factors. Regarding reliability, the majority of the factors were internally consistent (α >.74). The only exception was the goals and development factor within the intensity scale (α = .65); however, this factor was internally consistent (α >.74) for both the frequency and duration scales. To provide further evidence for internal reliability, all items were assessed against the aforementioned Kidder and Judd (1986) item analysis criteria. Out of the final 23 items, 3 did not display a minimum corrected item-total correlation coefficient of r = .40, and 17 interitem correlations (out of a potential 59) fell below the minimum value of r = .20, displaying values that ranged from .12 to .19. In view of the small amount of item violations and the model displaying adequate fit, all 23 items were retained within the final OSI-SP.

As suggested in the CFA literature (cf. Byrne, 2006; Jackson, Gillaspy, & Purc-Stephenson, 2009), alternative models were run to determine whether the first-order, five-factor, 23-item model demonstrated the best fit to the observed data. Firstly, a hierarchical model was tested in which the five first-order factors were represented by one higher-order factor. The fit of the hierarchical measurement model was worse than the 23-item model (though better than the five-factor, first-order, 33-item model): Frequency S-Bχ^2 (225) = 380.50, $p < .001$, CFI = .93, NNFI = .92, SRMR = .06, RMSEA = .04, Intensity S-Bχ^2 (225) = 417.04, $p < .001$, CFI = .93, NNFI = .92, SRMR = .06, RMSEA = .05, and Duration S-Bχ^2 (225) = 423.62, $p < .001$, CFI = .92, NNFI = .91, SRMR = .06, RMSEA = .05. Secondly, a one-factor model was tested (with the 23 items), which produced a very poor fit to the data: Frequency S-Bχ^2 (230) = 856.72, $p < .001$, CFI = .73, NNFI = .70, SRMR = .08, RMSEA = .09, Intensity S-Bχ^2 (230) = 922.87, $p < .001$, CFI = .73, NNFI = .70, SRMR = .09, RMSEA = .09, and Duration S-Bχ^2 (230) = 891.62, $p < .001$, CFI = .72, NNFI = .70, SRMR = .09, RMSEA = .09. The implications of these findings will be discussed later.

Study 4

The first purpose of Study 4 was to cross-validate the five-factor model supported in Study 3. Secondly, this study examined if components of the measurement model were invariant across different groups. Thirdly, Study 4 examined the concurrent validity of the OSI-SP by observing the relationships between organizational stressors and other relevant concepts.

Method

Participants. For participant (n = 321) details, see Table 2.

Measures. The following six instruments were used in Study 4.

Organizational Stressor Indicator for Sport Performers (OSI-SP). The 23-item OSI-SP, as described in Study 3, was distributed to participants.

Sport Emotion Questionnaire (SEQ). Sport performers' emotions were measured using all 22 items from the SEQ (Jones, Lane, Bray, Uphill, & Catlin, 2005). The five subscales on the SEQ are anxiety (five items), dejection (five items), anger (four items), excitement (four items), and happiness (four items). On a 5-point Likert-type scale that ranged from 0 (*not at all*) to 4 (*extremely*), participants were required to indicate how their participation in competitive sport over the past month had made them feel. All of the subscales were internally consistent (α = .77 to .87).

Athlete Satisfaction Questionnaire (ASQ). Sport performers' satisfaction was measured using six items from the ASQ (Riemer & Chelladurai, 1998). Three of these items related to individual performance and three to team performance. For each item, performers were provided with a 7-point Likert-type scale that ranged from 1 (*not at all satisfied*) to 7 (*extremely satisfied*). Both of the subscales displayed acceptable internal consistency (α = .78 to .86).

The Perceived Available Support in Sport Questionnaire (PASS-Q). Sport performers' perceptions of available support were measured using the tangible support subscale from the PASS-Q (Freeman, Coffee, & Rees, 2011). For each of the four items, a 5-point Likert-type scale that ranged from 0 (*not at all*) to 4 (*extremely*) was used to assess the extent to which performers felt they had each type of support available to them. The subscale was internally consistent ($\alpha = .87$).

The Group Environment Questionnaire (GEQ). Sport performers' perceptions of their group environments were measured using eight items from the GEQ (Widmeyer, Brawley, & Carron, 1985). Two items were taken from the attraction to group task subscale, two from the attraction to group social subscale, two from the group integration task subscale, and two from the group integration social subscale. Performers were required to answer each item on a scale of 1 (*strongest agreement*) to 9 (*strongest disagreement*). The internal consistency of the four subscales ranged from .45 to .70.

The Coach Athlete Relationship in Sport Questionnaire (CART-Q). The perceived relationship between a sport performer and his or her coach was measured using the CART-Q (Jowett & Ntoumanis, 2004). Participants were instructed to respond to all 11 items with their principal coach in mind on a 7-point Likert-type scale that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). All of the subscales (closeness, commitment, and complementarity) were internally consistent ($\alpha = .86$ to .93).

Procedure. The procedures remained the same as those outlined in Studies 2 and 3. Both online ($n = 283$) and paper ($n = 38$) versions of the OSI-SP were distributed and collected.[2] In addition, the SEQ was completed by participants in Studies 2, 3, and 4 ($n = 1277$), and the ASQ, PASS-Q, GEQ, and CART-Q were completed by participants in Studies 3 and 4 ($n = 671$).

Results

Confirmatory Factor Analyses. The 23-item five-factor solution was analyzed with CFA using EQS 6.1 (Bentler & Wu, 2002). The model displayed an acceptable fit to the data if adopting the SRMR, RMSEA, and original CFI guidelines (cf. Bentler, 1992): Frequency S-Bχ^2 (220) = 335.16, $p < .001$, CFI = .95, NNFI = .94, SRMR = .05, RMSEA = .04, Intensity S-Bχ^2 (220) = 341.11, $p < .001$, CFI = .94, NNFI = .93, SRMR = .05, RMSEA = .04, and Duration S-Bχ^2 (220) = 331.21, $p < .001$, CFI = .94, NNFI = .94, SRMR = .06, RMSEA = .04. Furthermore, the model displays an acceptable fit to the frequency scale and is close to acceptable values for the intensity and duration scales if adopting Hu and Bentler's (1999) revised CFI cutoff value of .95. These results confirm the validity of the factorial model.[3] In addition to conducting the CFAs separately for the three response scales (frequency, intensity, duration), we also tested an overall measurement model that simultaneously included the three response scales of the OSI-SP. This model displayed an acceptable fit to the data: S-Bχ^2 (2244) = 3292.75, $p < .001$, CFI = .95, NNFI = .95, SRMR = .06, RMSEA = .04. In addition, the results highlighted that the items were not cross loading across the frequency, intensity, and duration scales; instead, they were loading onto separate response formats as hypothesized. Together with the results of the rating scale correlations reported in the next section and discussed later, these overall measurement model results indicate that the three response scales are distinct and separate entities.

Table 3 displays item means, standard deviations, and standardized factor loadings for the final 23-item solution. All five subscales demonstrated acceptable internal consistency (frequency $\alpha = .75$ to .85, intensity $\alpha = .71$ to .83, and duration $\alpha = .74$ to .83). The fit values for the hierarchical measurement model were as follows: Frequency S-Bχ^2 (225) = 357.20, $p < .001$, CFI = .94, NNFI = .93, SRMR = .06, RMSEA = .04, Intensity S-Bχ^2 (225) = 372.01, $p < .001$, CFI = .93, NNFI = .92, SRMR = .06, RMSEA = .05, and Duration S-Bχ^2 (225) = 347.11, $p < .001$, CFI = .94, NNFI = .93, SRMR = .06, RMSEA = .04. The implications of these findings will be discussed later.

Rating Scale Correlations. This study also further tested the frequency, intensity, and duration rating scales with the data from Study 3 and 4 participants ($n = 671$). For each of the five factors on the frequency, intensity, and duration scales (15 factor scores), latent variable correlations ranged from $r = .80$ to .91 (95% CI [.76, .93]). Similar to Study 2, these correlations and 95% CIs suggest that the rating scales are distinct. However, we conducted a further CFA to confirm this. Therefore, for each factor, we used the Satorra–Bentler difference test (ΔS-B χ^2; Satorra & Bentler, 2001) to compare an unconstrained model and three constrained models: (a) a model in which frequency and intensity scales from the same factor were constrained to have a correlation of 1.00; (b) a model in which frequency and duration scales from the same factor were constrained to have a correlation of 1.00; and (c) a model in which intensity and duration scales from the same factor were constrained to have a correlation of 1.00. Since latent variables are unobserved and have no definitive metric scale (cf. Byrne, 2006), factor variances were constrained to 1.00 for the purposes of identification. Out of the 15 ΔS-B χ^2 scores calculated, three were significant at $p < .05$ and two at $p < .01$. The implications of these findings will be discussed later.

Invariance Testing. A sequential model testing approach was employed via multisample CFA to examine whether the OSI-SP displayed invariance across different variables. These were: gender (male or female), sport type (team or individual), competitive level (low or high, where club and county were classified as low, and

Table 3 Item Means, Standard Deviations, Factor Loadings, and Skewness and Kurtosis Values Following CFA for Frequency, Intensity, and Duration Scales (Study 4)

	Frequency					Intensity					Duration				
OSI-SP Subscale and Item	*M*	*SD*	Loading	Skewness	Kurtosis	*M*	*SD*	Loading	Skewness	Kurtosis	*M*	*SD*	Loading	Skewness	Kurtosis
Goals and Development															
The spectators that watch me perform	1.60	1.26	.50	.60	-.04	1.83	1.46	.55	.25	-1.07	1.60	1.24	.51	.28	-.74
My goals	2.69	1.43	.66	-.20	-.73	2.71	1.46	.70	-.29	-.81	2.68	1.51	.73	-.16	-.97
Injuries	2.04	1.36	.38	.31	-.59	2.48	1.55	.39	-.12	-1.08	2.35	1.53	.32	.03	-1.09
The food that I eat	1.85	1.67	.58	.52	-.99	1.75	1.58	.56	.51	-.91	1.76	1.66	.56	.58	-.95
The development of my sporting career	1.95	1.55	.78	.28	-1.05	2.01	1.61	.76	.21	-1.17	2.03	1.67	.74	.30	-1.17
My training schedule	2.07	1.44	.64	.17	-.84	2.12	1.48	.66	.08	-1.02	2.17	1.53	.65	.11	-1.03
Logistics and Operations															
The technology used in my sport	.85	1.14	.55	1.46	1.64	.89	1.16	.50	1.40	1.57	.81	1.14	.48	1.65	2.52
Traveling to or from training or competitions	2.08	1.31	.44	.24	-.50	2.07	1.28	.54	.03	-.74	1.81	1.14	.48	.15	-.54
The organization of the competitions that I perform in	1.43	1.24	.45	.81	.19	1.52	1.33	.40	.64	-.44	1.36	1.28	.46	.94	.26
The training or competition venue	1.38	1.27	.65	.78	.03	1.44	1.38	.65	.68	-.47	1.36	1.26	.61	.67	-.38
The accommodation used for training or competitions	.79	1.09	.55	1.58	2.38	.80	1.13	.57	1.46	1.69	.81	1.10	.64	1.45	1.70
What gets said or written about me in the media	.66	1.10	.47	1.87	2.95	.74	1.25	.42	1.80	2.43	.68	1.09	.46	1.82	3.02
The regulations in my sport	.88	1.15	.55	1.61	2.64	.87	1.12	.49	1.28	.97	.83	1.08	.49	1.46	1.88
The funding allocations in my sport	1.22	1.56	.47	1.06	-.15	1.30	1.60	.47	.91	-.56	1.30	1.63	.50	.97	-.44
The organization that governs and controls my sport	1.02	1.25	.58	1.40	1.43	1.11	1.35	.53	1.18	.53	1.04	1.29	.56	1.30	1.02
Team and Culture															
The atmosphere surrounding my team	1.44	1.31	.84	.47	-.84	1.55	1.40	.80	.39	-1.11	1.46	1.32	.79	.54	-.62
My teammates' attitudes	1.80	1.44	.85	.32	-.83	1.94	1.52	.82	.22	-1.05	1.80	1.44	.84	.30	-.97
The responsibilities that I have on my team	2.05	1.60	.65	.26	-1.05	2.06	1.55	.60	.11	-1.18	1.90	1.50	.60	.26	-1.02
The shared beliefs of my teammates	1.24	1.27	.84	.74	-.40	1.29	1.32	.78	.71	-.65	1.24	1.28	.80	.84	-.24
Coaching															
The relationship between my coach and I	1.28	1.35	.89	.77	-.42	1.42	1.53	.84	.63	-1.00	1.26	1.38	.74	.83	-.39
My coach's personality	1.15	1.32	.80	1.03	.19	1.19	1.40	.78	1.01	.09	1.11	1.34	.77	1.11	.37
Selection															
How my team is selected	1.59	1.47	.76	.59	-.58	1.71	1.58	.80	.48	-.94	1.58	1.49	.74	.56	-.82
Selection of my team for competition	1.66	1.55	.96	.49	-.90	1.76	1.60	.88	.39	-1.12	1.65	1.53	.92	.52	-.89

collegiate/university, senior national, and international were classified as high), and competitive experience (low or high based on a median split). For each of these variables, a baseline model was established and then additional models were devised that were increasingly constrained. These models were specified to examine the equality of measurement (item loadings) and structural parameters (factor variances and covariances) of the OSI-SP across the different groups (Byrne, 2006). Traditionally, invariance testing has used the ΔS-B χ^2 test statistic to indicate equality across groups; however, this test is influenced by sample size (Byrne, 2006). As a result, alongside using the ΔS-B χ^2 difference test (Satorra & Bentler, 2001), we followed the recommendations of Cheung and Rensvold (2002). These recommendations indicate that a change in CFI of $\leq .01$ is considered indicative of model invariance. Although there were six significant changes in the S-Bχ^2 difference test, two of which occurred when the factor loadings were constrained across groups (gender frequency, ΔS-B $\chi^2 = 31.80$, and gender duration, ΔS-B $\chi^2 = 36.48$) and four when the factor covariances were constrained (sport type intensity, ΔS-B $\chi^2 = 21.57$, competitive level frequency, ΔS-B $\chi^2 = 20.16$, competitive level intensity, ΔS-B $\chi^2 = 27.21$, and competitive level duration, ΔS-B $\chi^2 = 31.24$), the change in CFI values for all of the frequency, intensity, and duration scales were $\leq .01$ in all the analyses. These findings support the equality of factor loadings, variances, and covariances on the OSI-SP across gender, sport type, competitive level, and competitive experience.

Concurrent Validity. Table 4 shows the correlations between the OSI-SP scales and other variables.

Organizational Stressors and Emotions. For each of the three rating scales, the OSI-SP factors were all significantly correlated with anxiety ($r = .21$ to $.39$), dejection ($r = .23$ to $.32$), and anger ($r = .21$ to $.33$) (all ps $< .01$). Some of the OSI-SP factors significantly correlated with excitement ($r = .06$ to $.13$) and happiness ($r = .06$ to $.07$) (all ps $< .05$).

Organizational Stressors and Athlete Satisfaction. There was a significant relationship between the Goals and Development frequency, intensity, and duration scales and satisfaction with individual performance ($r = .09$ to $.12$, $p < .05$).

Organizational Stressors and Perceived Available Support. Perceived tangible support was significantly correlated with the Goals and Development ($r = .11$ to $.13$, $p < .01$), Logistics and Operations ($r = .13$, $p < .01$), Team and Culture ($r = .08$ to $.10$, $p < .05$), Coaching ($r = .08$ to $.10$, $p < .05$), and Selection ($r = .08$ to $.10$, $p < .05$) frequency, intensity, and duration scales.

Organizational Stressors and the Group Environment. There was a significant positive correlation between attraction to the group task and the Goals and Development frequency scale ($r = .08$, $p < .05$), the Logistics and Operations ($r = .10$, $p < .05$), Team and Culture ($r = .16$, $p < .01$), Coaching ($r = .11$ to $.14$, $p < .01$), and Selection ($r = .09$ to $.13$, $p < .05$) frequency, intensity, and duration scales. Attraction to group social significantly correlated with the Goals and Development duration scale ($r = -.08$, $p < .05$). For group integration, the task element was significantly correlated with the Team and Culture frequency, intensity, and duration scales ($r = .08$ to $.10$, $p < .05$). The social element of group integration was significantly correlated with the Goals and Development frequency, intensity, and duration scales ($r = -.08$ to $-.09$), the Team and Culture frequency scale ($r = -.09$), and the Selection intensity and duration scales ($r = .08$ to $.09$) (all ps $< .05$).

Organizational Stressors and the Coach–Athlete Relationship. There were no significant correlations between the organizational stressor factors and coach–athlete relationship closeness. The Goals and Development intensity and duration scales were significantly related to coach–athlete relationship commitment ($r = .09$) and the Logistics and Operations frequency and intensity scales were significantly related to coach–athlete relationship complementarity ($r = -.08$ to $-.09$) (all ps $< .05$).

Discussion

Although organizational stressors are prevalent in competitive sport (Arnold & Fletcher, 2012b), to date no measure has been developed to comprehensively assess these demands in the sport context. The research reported here sought to address this issue by developing and validating the OSI-SP via a series of four related studies. The outcome was a 23-item indicator that assesses the frequency, intensity, and duration of the organizational stressors encountered by sport performers, consisting of five subscales: Goals and Development, Logistics and Operations, Team and Culture, Coaching, and Selection. Analyses indicate that the OSI-SP provides an accurate and reliable measure of these demands.

The five factors emerging from this research represent parsimonious, but inclusive, subscales of organizational stressors that are underpinned by previous qualitative research in this area (see Arnold & Fletcher, 2012b). Although the indicator items were originally developed for each of the 31 subcategories in Arnold and Fletcher's (2012b) taxonomic classification, the results reported here indicate that it was not possible to extract 31 independent factors and that a five-factor model is most appropriate. Hence, although it is possible to subjectively distinguish between numerous subcategories of organizational stressors, the conceptual links and empirical relationships between them point to a more parsimonious approach to assessment. Moreover, from a practical perspective, a 31-factor indicator and its associated items would be time consuming to complete, particularly alongside other questionnaires in future research studies.

Table 4 Correlations Between Organizational Stressors, Emotions, Athlete Satisfaction, Perceived Available Support, the Group Environment, and the Coach–Athlete Relationship (Study 4)

	Variable	Sample Size	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Goals and Development Frequency	1277	2.02	.97	.75														
2	Goals and Development Intensity	1277	2.15	1.05	.89	.71													
3	Goals and Development Duration	1277	2.06	1.00	.90	.89	.74												
4	Logistics and Operations Frequency	1277	.99	.76	.53	.47	.47	.80											
5	Logistics and Operations Intensity	1277	1.04	.79	.51	.49	.49	.94	.79										
6	Logistics and Operations Duration	1277	.98	.77	.50	.47	.51	.92	.94	.80									
7	Team and Culture Frequency	1277	1.60	1.16	.45	.41	.41	.46	.43	.46	.85								
8	Team and Culture Intensity	1277	1.66	1.19	.43	.43	.42	.44	.44	.45	.93	.83							
9	Team and Culture Duration	1277	1.58	1.15	.42	.41	.44	.43	.43	.48	.91	.93	.83						
10	Coaching Frequency	1277	1.35	1.25	.47	.42	.43	.40	.38	.39	.58	.55	.55	.83					
11	Coaching Intensity	1277	1.43	1.34	.44	.45	.45	.39	.39	.40	.54	.56	.54	.92	.82				
12	Coaching Duration	1277	1.35	1.29	.44	.44	.45	.37	.37	.41	.54	.54	.56	.90	.91	.81			
13	Selection Frequency	1277	1.78	1.40	.39	.34	.32	.32	.29	.30	.55	.53	.52	.48	.46	.44	.80		
14	Selection Intensity	1277	1.90	1.46	.36	.37	.34	.30	.30	.31	.52	.53	.51	.46	.47	.45	.91	.79	
15	Selection Duration	1277	1.74	1.36	.37	.36	.37	.34	.34	.36	.54	.54	.55	.46	.46	.46	.90	.91	.76
16	SEQ-Anxiety	1277	1.90	.91	.38	.39	.38	.21	.22	.21	.23	.23	.22	.29	.30	.28	.21	.23	.23
17	SEQ-Dejection	1277	1.23	.94	.29	.27	.28	.23	.23	.24	.32	.30	.30	.32	.30	.29	.29	.29	.30
18	SEQ-Anger	1277	1.52	1.05	.24	.23	.24	.23	.21	.22	.33	.31	.30	.29	.27	.27	.30	.29	.31
19	SEQ-Excitement	1277	2.81	1.05	.13	.13	.13	*.06*	*.06*	.04	.08	.08	*.07*	.05	*.07*	.04	*.06*	*.07*	.05
20	SEQ-Happiness	1277	2.65	.82	.05	*.06*	.05	.03	.03	.02	*.07*	*.06*	*.06*	-.00	.01	-.01	.02	.02	.00
21	ASQ-Satisfaction—Team Performance	671	4.37	1.57	.05	.05	.04	.02	.02	.02	-.04	-.04	-.06	-.03	-.03	.00	-.03	-.05	-.03
22	ASQ-Satisfaction—Individual Performance	671	4.27	1.39	.10	.12	*.09*	.01	.03	.01	.03	.02	.01	.00	.02	.04	-.03	-.01	-.01
23	PASS-Q-Perceived Tangible Support	671	1.96	1.10	.13	.13	.11	.13	.13	.13	*.10*	*.08*	*.08*	*.08*	*.10*	*.09*	*.10*	*.08*	*.08*
24	GEQ-Attraction to Group Task	671	3.81	2.09	*.08*	.07	.04	*.10*	*.10*	.10	.16	.16	.16	.14	.13	.11	.11	.13	*.09*
25	GEQ-Attraction to Group Social	671	4.02	2.32	-.06	-.06	*-.08*	-.00	.01	.02	-.05	-.03	-.03	-.06	-.06	-.07	-.08	-.06	-.09
26	GEQ-Group Integration Task	671	4.22	1.85	-.01	-.02	-.01	.05	.04	.06	*.09*	*.08*	*.10*	.03	.03	.04	-.01	.01	.01
27	GEQ-Group Integration Social	671	4.46	2.07	*-.09*	*-.08*	*-.08*	.02	.02	.03	*-.09*	-.07	-.08	-.06	-.07	-.05	-.08	*-.09*	*-.08*
28	CART-Q-Closeness	671	5.39	1.49	.04	.06	.06	-.04	-.03	-.03	-.05	-.03	-.05	-.05	-.02	-.02	-.04	-.02	-.01
29	CART-Q-Commitment	671	4.68	1.50	.07	*.09*	*.09*	-.01	.01	.01	-.04	-.02	-.04	-.03	.00	-.01	-.02	-.00	-.01
30	CART-Q-Complementarity	671	5.33	1.38	.02	.05	.05	*-.09*	*-.08*	-.07	-.07	-.05	-.06	-.07	-.04	-.04	-.01	.01	.01

Note. Cronbach's alpha values appears on the matrix diagonal. Pearson's *r* values appear below the matrix diagonal (underlined values significant at $p < .01$; italic values significant at $p < .05$).

For the first-order, five-factor, 23-item models tested in Studies 3 and 4, only the frequency scale met Hu and Bentler's (1999) revised CFI cutoff value of .95. Nonetheless, in both Studies 3 and 4, all three scales met the SRMR, RMSEA and original CFI guidelines (cf. Bentler, 1992). Thus, the OSI-SP demonstrates acceptable factorial validity when measuring the frequency, intensity, and duration of the organizational stressors encountered by sport performers; however, future research should continue to test the factor structure and the validity of the OSI-SP further. Within these tests, scholars should particularly examine the two factors in the OSI-SP (coaching and selection) that include only two items, since it is generally accepted that subscales should consist of three or more items (Howell, 2001; MacCallum, Browne, & Sugawara, 1996; Tabachnick & Fidell, 2001). Although these factors were deemed reliable (α = >.76) and the factor structure valid in this research, future research should examine the psychometric properties of these two factors and investigate them in relation to other relevant measures (see, e.g., Kristiansen et al., 2012).

To establish whether all three rating scales are required for future use of the OSI-SP, correlations between the frequency, intensity, and duration scales were calculated. The correlations suggest that the rating scales are distinct and, therefore, are assessing different dimensions of organizational stressors. Nevertheless, even though the correlations were less than unity, the correlations between the scales suggest that they are highly related. Therefore, future researchers wishing to gain a more comprehensive picture of performer–organization transactions should use all three rating scales; however, the frequency scale alone would likely be adequate for researchers or practitioners requiring a shorter version of the indicator.

In addition to examining the five-factor model in Study 3, a one-factor structure was also tested; however, this displayed a very poor fit to the data. This finding indicates that organizational stressors are a multifactorial construct that are best represented by a number of separate, albeit related, environmental demands. In Studies 3 and 4, a hierarchical structure was also tested that produced fit values that were only marginally lower than that of the first-order, 23-item model. Marsh (1987) remarked that the fit of a second-order model cannot be better than the fit of the equivalent first-order structure; therefore, he suggested that if the fit of the higher model approaches that of the first-order model, the hierarchical structure should be preferred because it is more parsimonious. As a result, it is suggested that the hierarchical model should be adopted by researchers interested in a general measure of organizational stressors (e.g., for measuring these environmental demands in complex structural equation modeling). However, for those examining the relationships between specific organizational stressors, other concepts, and/or various outcomes, we suggest that the five-factor model will likely be most applicable since it provides a more in-depth assessment. Study 4 also provided support for the factorial invariance of the measurement model by finding that the factor loadings, variances, and covariances were equivalent across gender, sport type, competitive level, and competitive experience. As a result, it is now possible for researchers to assess organizational stressors across different groups of sport performers and make more meaningful comparisons between them (cf. Vandenberg & Lance, 2000).

This research found support for the concurrent validity of the OSI-SP by reporting significant correlations between organizational stressors and emotions, satisfaction with individual performance, perceived available tangible support, the group environment, and perceived commitment and complementarity in the coach–athlete relationship. Some of these relationships are in accordance with the extant literature in sport psychology, which has indicated that stressors, many of which Arnold and Fletcher (2012b) classified as organizational stressors in their taxonomy, are related to positive and negative emotional responses and feeling states (Fletcher, Hanton, & Wagstaff, 2012; Gould, Eklund, & Jackson, 1992a, 1992b; Gould, Udry, Bridges, & Beck, 1997; Nicholls, Backhouse, Polman, & McKenna, 2009; Nicholls, McKenna, Polman, & Backhouse, 2011), satisfaction (Fletcher et al., 2012; Tabei, Fletcher, & Goodger, 2012), and perceived available tangible support (Kristiansen & Roberts, 2009). However, further empirical research is required to examine in greater detail the correlations reported in this paper, in particular those between organizational stressors and the group environment, and organizational stressors and perceived commitment and complementarity in the coach–athlete relationship. From a theoretical perspective, the metamodel of stress, emotions, and performance (Fletcher et al., 2006) posits that these variables act as situational moderators of the transactional stress process that serve as buffers or as exacerbates of the P-E and E-P relationships. The OSI-SP provides researchers with a measure that, used in conjunction with other measures, can further our understanding of the organizational stress process in sport and the relationships between the main components. To examine the relationships between stressors and other components in the stress process, future research should consider the use of Bayesian networks (cf. Darwiche, 2009; Koski & Noble, 2011). To elaborate, by depicting the pathways among and describing the quantitative associations between observed variables, these networks will enable scholars to not only elicit information on the relationships between stressors and other components in the stress process, but also design valuable experiments in which the effects and impacts of hypothetical interventions can be tested and predicted before actually being implemented.

This research has developed the first valid and reliable measure of the organizational stressors encountered by sport performers. In contrast to previous measures in the sport context, which have only assessed a small number of organizational-related demands (see, e.g., Kristiansen et al., 2012), the OSI-SP can be used to assess a comprehensive range of organizational stressors in competitive sport. Notwithstanding this strength, it is worth highlighting some of the limitations of the series of studies reported here. Firstly, like many other measures of stressors in the organizational psychology literature (see, for a review, Rick et al., 2001), this research relied solely on self-report data. Although an individual's own reports provide insights into his or her perceptions of the environment, the self-report of stressors can be confounded by attitudes, habitual coping responses, and social constructions (Howard, 1994; Spector, 1994). To address this limitation, future research should consider adopting a triangulation strategy, which incorporates multiple methods (e.g., self-reports, observations, physiological indices) into a study design so that the drawbacks of one method can be attenuated by the strengths of another (cf. Arnold & Fletcher, 2012a). An individual's self-report can also be influenced by memory bias. The OSI-SP asks participants about the pressures they have experienced over the past month because the authors deemed this to be an appropriate time period for encountering and recollecting organizational stressors. Some research suggests, however, that retrospective reports of one's experiences over time tend not to be accurate (cf. Thomas & Diener, 1990). As a result, to minimize memory bias, future research should attempt to validate the OSI-SP with different temporal instructions (e.g., over the past day or week) and incorporate the OSI-SP into methods such as daily diaries. A second limitation of this research was the cross-sectional and correlational nature of the data collected. This approach was appropriate for developing and validating the measure and initially exploring relationships in this area; however, future research should adopt longitudinal designs to better capture the complex and ongoing nature of organizational stress.

To conclude, the four related studies presented here report the development and validation of a psychometrically sound indicator that assesses the organizational stressors encountered by sport performers. This indicator—labeled the Organizational Stressor Indicator for Sport Performers (OSI-SP)—measures the frequency, intensity, and duration of the demands, consisting of five subscales: Goals and Development, Logistics and Operations, Team and Culture, Coaching, and Selection. The OSI-SP provides a diagnostic measure that researchers and practitioners can use to assess environmental demands and to better understand the organizational environment in competitive sport.[4]

Notes

1. In accordance with guidelines in this area (cf. Lonsdale, Hodge, & Rose, 2006), we adopted a sequential model testing approach via multisample CFA to examine whether the measurement models for paper and online methods were invariant. The results highlighted that the change in CFI values for the frequency, intensity, and duration response scales were ≤.01 in all the analyses (cf. Cheung & Rensvold, 2002); therefore, supporting the equality of factor loadings, variances, and covariances on the OSI-SP across paper and online methods of data collection. As a result, paper and online data were merged before the analyses.

2. Due to the majority of data collection in this study occurring online (n = 283) and, therefore, the low number of participants who completed paper versions of the measures (n = 38), it was not possible to examine whether the measurement models for the two data collection methods displayed invariance in this study (cf. Byrne, 2006). In view of the invariance displayed between the measurement models of online and paper methods in Studies 2 and 3, it was decided to also merge the paper and online data before analyses in Study 4.

3. For Study 3 and 4 data, equation systems in CFA were developed to test and, subsequently, report a formative model (cf. Coltman et al., 2008; Kline, 2006). To identify the factors in this model, the outputs (i.e., emotions and athlete satisfaction) were specified as consequences of the formative factors (i.e., factors were treated as causes of outputs). Stressor items were used to predict their hypothesized stressor factor, and the stressor items were allowed to correlate with other items within their hypothesized stressor factor, but not with stressor items hypothesized to load on other stressor factors. Disturbances between stressor factors were allowed to correlate. In this way, the formative model enabled a check under a different set of causal assumptions of whether stressor items were loading on their respective factors and not cross loading on other stressor factors. Separate analyses were conducted for frequency, intensity, and duration items, and for emotions and athlete satisfaction as outcomes. These formative models provided good fit to the data (e.g., range of CFIs = 1.00–1.00; range of NNFIs = 1.07–1.08; range of RMSEAs = .00 to .00). Although the CFI, NNFI, and RMSEA ranges indicate good fit for the formative models, the SRMR range (.19–96.58) did not. The SRMR is known to be sensitive to model misspecification (Hu & Bentler, 1998) and may be problematic in models in which there are small differences between the observed and reproduced covariance matrices (Browne, MacCallum, Kim, Anderson, & Glaser, 2002). In the former case, model misspecification may have arisen because a formative factor model was specified when a reflective model was more appropriate. In the latter case, small differences between observed and reproduced covariance matrices may have arisen because 23 items were used to predict just five factors (formative model), rather than five factors being used to predict 23 items (reflective model), therefore meaning that a great deal of the covariance matrix (i.e., many of the covariances for the 23 items) is the same in the observed as in the reproduced matrix (i.e., no difference in large parts of the matrix). In light of potential problems of the SRMR in this instance, and that the CFI, NNFI, and RMSEA may not be as sensitive to small differences between the observed and reproduced covariance matrices (Browne et al., 2002), we believe that the CFI, NNFI, and RMSEA values illustrate that the stressor items are associated with their hypothesized factors and not associated with nonhypothesized factors in the same way as with the reflective models, indicating that the structure of the OSI-SP is robust to different causal modeling assumptions. At a practical level, these additional analyses indicate the OSI-SP would be scored the same way whether researchers wish to adopt reflective or formative assumptions concerning how

latent factors relate to specific items. Nevertheless, given the CFI, NNFI, and RMSEAs for the formative models indicated good fit, future research may investigate whether the assumptions underpinning reflective or formative models are more appropriate for understanding how specific stressors (items) are generated in sport organizations.

4. The Organizational Stressor Indicator for Sport Performers (OSI-SP) and its technical manual are available from www.osisport.info.

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